

Application No. 10/733,325  
Reply to Office Action mailed May 12, 2005

Patent  
Attorney Docket No. 86200-11

## **II. REMARKS/ARGUMENTS**

The Applicants gratefully acknowledge the potential allowability of claims 49 and 50.

### **A. Summary of the Amendments**

The application now contains fifty-eight (58) claims, numbered 1 to 38 and 48 to 67.

Claims 2, 4, 14, 16, 20, 21, 24, and 33 to 35 have been amended in order to correct certain minor informalities and clarify the subject matter being claimed. New claims 53 to 67 have been added. Support for these new claims may be found, *inter alia*, on page 8, lines 3 to 22; page 10, line 19 to page 11, line 3; and Figures 8a, 8b, 10a and 10b of the specification as originally filed.

It is respectfully submitted that no new matter has been added to the application by the present response.

### **B. Summary of Objections, Rejections and Reply**

#### **B.1 Objection to claim 4**

On page 2 of the Office Action, the Examiner objected to claim 4 due to the expression "in claim 4". In response, claim 4 has been amended to replace the number "4" by the number "3". Accordingly, the Examiner is respectfully requested to withdraw the objection to claim 4.

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## **B.2 Objection to the**

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## **B.3 Rejection of clai**

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### Independent claim 1

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67. (new) A method for use in creating a grating on an optical waveguide, said method comprising:
- generating first and second beams of electromagnetic radiation;
  - conditioning and directing the first and second beams of electromagnetic radiation toward a treatment area of the optical waveguide to cause the first and second beams of electromagnetic radiation to interact and induce a non-linear index of refraction change over the treatment area.

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## **B.2 Objection to the title of the specification**

On page 2 of the Office Action, the Examiner objected to the title of the specification stating that an "e" is allegedly missing between "ind" and "x" in the first line of the title on page 1.

In response, it is respectfully submitted that the title on page 1 of the specification as originally filed correctly reads:

"Method and apparatus for inducing an index of refraction  
change on a substrate sensitive to electromagnetic radiation"

It is respectfully submitted that the word "index" on the first line of the title is correctly spelled and that no "e" is missing between "ind" and "x". Accordingly, it is respectfully submitted that no correction of the title is required. The Examiner is thus respectfully requested to withdraw the objection to the title of the specification.

## **B.3 Rejection of claims 1 to 38, 48, 51 and 52 under 35 U.S.C. 103**

On page 3 of the Office Action, the Examiner rejected claims 1 to 38, 48, 51 and 52 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,067,391 to Land (hereinafter referred to as "Land").

As described below, the Applicants respectfully traverse the Examiner's rejection and respectfully submit that claims 1 to 38, 48, 51 and 52 are in condition for allowance.

### **Independent claim 1**

The Examiner's attention is directed to the following features of claim 1, portions of which have been emphasized:

1. An apparatus for treating a substrate sensitive to electromagnetic radiation, comprising;

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- a) a first mask for **conditioning** a first beam of electromagnetic radiation and producing a first **conditioned** beam of electromagnetic radiation;
- b) a second mask for **conditioning** a second beam of electromagnetic radiation and producing a second **conditioned** beam of electromagnetic radiation;
- c) the first and the second **conditioned** beams of electromagnetic radiation being characterized in that:
  - i) when they are directed toward the substrate sensitive to electromagnetic radiation, a treatment area of the substrate sensitive to electromagnetic radiation is exposed to electromagnetic radiation;
  - ii) the first and the second **conditioned** beams of electromagnetic radiation interact to create an interference pattern over a limited portion of the treatment area.

It is respectfully submitted that Land does not teach or suggest first and second masks for respectively conditioning first and second beams of electromagnetic radiation to respectively produce first and second conditioned beams of electromagnetic radiation such that, when the first and second conditioned beams are directed toward a substrate sensitive to electromagnetic radiation:

- (i) "a treatment area of the substrate [...] is exposed to electromagnetic radiation" of the conditioned beams; and
- (ii) "the first and the second conditioned beams [...] interact to create an interference pattern over a limited portion of the treatment area".

Specifically, Land describes using phase gratings or prismatic surfaces to obtain crossed beams that provide standing wave interference patterns on a waveguide in order to induce multiply periodic modulation (MPM) on the waveguide (col. 24, line 59 to col. 25, line 9). However, in Land, the interference pattern created by any given two crossed beams extends over the entirety of the area of the waveguide that is exposed to electromagnetic radiation of the two crossed beams, not just over a limited portion of that area. (This is the case for Land as a whole and in particular for the figures and passages referenced by the Examiner, namely, Figures 14 and 16 and column 9, last paragraph to column 10, first paragraph.)

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Clearly, therefore, Land in no way teaches or suggests the features of claim 1, i.e. conditioning first and second beams of electromagnetic radiation to respectively produce first and second conditioned beams of electromagnetic radiation such that, when the first and second conditioned beams are directed toward a substrate sensitive to electromagnetic radiation:

- (i) "a treatment area of the substrate [...] is exposed to electromagnetic radiation" of the conditioned beams; and
- (ii) "the first and the second conditioned beams [...] interact to create an interference pattern over a limited portion of the treatment area".

In light of the above, it is respectfully submitted that at least one feature of claim 1 is neither taught nor suggested by the cited reference. Therefore, the Applicants respectfully submit that at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j)\* is not satisfied. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 1 and it is respectfully submitted that claim 1 is in condition for allowance.

If for any reason the Examiner disagrees, then the Examiner is kindly and respectfully urged to identify which features of Land the Examiner considers as being the claimed first and second masks for respectively conditioning first and second beams of electromagnetic radiation so as to create an interference pattern over a limited portion of the treatment area exposed to electromagnetic radiation of the first and second conditioned beams. The Examiner is also respectfully requested to note that an argument which fails to identify the claimed first and second masks for conditioning cannot support a finding of obviousness, as the third criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) will not be satisfied.

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\* For the Examiner to establish a *prima facie* case of obviousness, three criteria must be considered: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings, (2) there must be a reasonable expectation of success, and (3) the prior art references must teach or suggest all of the claim limitations. MPEP §§ 706.02(j), 2142 (8th ed.).

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Dependent claims 2 to 19, 51 and 52

Claims 2 to 19, 51 and 52 depend either directly or indirectly on claim 1 and therefore include all of the features of claim 1. Hence, for the same reasons as those set forth herein above in respect of claim 1, it is respectfully submitted that claims 2 to 19, 51 and 52 are in condition for allowance.

*Additional comments regarding claims 8 to 11*

Notwithstanding that claims 8 to 11 are believed to be in condition for allowance due to their dependency on claim 1, it is respectfully submitted that claims 8 to 11 are in condition for allowance for the following additional reason. Specifically, the Examiner's attention is directed to the following emphasized features of claims 8 to 11:

8. An apparatus as defined in claim 7, wherein the Bragg grating has an apodization.

9. An apparatus as defined in claim 8, wherein the apodization is a Gaussian apodization.

10. An apparatus as defined in claim 9, wherein the index of refraction is altered substantially uniformly over the first portion to form a base value, the Gaussian apodization being symmetrical on either side of the base value.

11. An apparatus as defined in claim 10, wherein the waveguide defines an electromagnetic radiation propagation axis, the Gaussian apodization forming an amplitude profile of the Bragg grating along the electromagnetic radiation propagation axis.

As conceded by the Examiner on page 4 of the Office Action, Land does not teach a Gaussian apodization symmetrical on either side of a base value. The Examiner, however, indicated that:



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"Land states that a waveguide exposed and effected/sensitive by/to the EM radiation can be substrate-waveguides (see at least col. 10, 1<sup>st</sup> parag.) and that waveguide/substrate portions being exposed to EM radiation being uniform in at least s/f (1,1) and f/s (3,U) Thus, it would have been obvious to a person skilled in the art when the invention was made combine different embodiments of Land by substitute the above waveguide by a substrate/substrate-waveguide, and that it is obvious/well-known to those of ordinary skill in the art when the invention was made that uniform amplitude/wave form as shown in at least fig. 1, have s/f (1,1) and f/s (3,U) have apodization being symmetrical on either side of base value, in order to produce an apparatus that includes the above limitations" [sic]

Disregarding the grammatical inconsistencies and lack of clarity in the Examiner's statement, it is respectfully submitted that Land does not describe an apparatus which intends to produce a Bragg grating having an apodization. In fact, Land actually describes arrangements intended to "eliminate apodization" or "avoid apodization" (emphasis added, col. 29, lines 53 to 55 and col. 30, lines 64 to 67). Thus, Land actually *teaches away* from producing a Bragg grating having an apodization, let alone a Gaussian apodization or a Gaussian apodization being symmetrical on either side of a base value.

For the above additional reason, and notwithstanding that claims 8 to 11 are believed to be in condition for allowance due to their dependency on claim 1, it is once again respectfully submitted that claims 8 to 11 are in condition for allowance.

*Additional comments regarding claim 51*

Notwithstanding that claim 51 is believed to be in condition for allowance due to its dependency on claim 1, it is respectfully submitted that claim 51 is in condition for allowance for the following additional reason. Specifically, the Examiner's attention is directed to the following emphasized features of claim 51:

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51. An apparatus as defined in claim 1, wherein said first mask imparts a **first cross-sectional shape** to the first beam of electromagnetic radiation, said second mask imparts a **second cross-sectional shape** to the second beam of electromagnetic radiation, the first cross-sectional shape being **different from the second cross-sectional shape**.

As conceded by the Examiner on page 7 of the Office Action, Land does not teach that:

- "[the] first mask imparts a first cross-sectional shape to the first beam of electromagnetic radiation"; and
- "[the] second mask imparts a second cross-sectional shape to the second beam of electromagnetic radiation";

whereby "the first cross-sectional shape [is] different from the second cross-sectional shape."

However, the Examiner indicated that "Land states that the above cross-sectional for forming [*sic*] beam/grating pattern can be in a variety of shapes (see figure 12a, different shapes/slotted cross-section for beam forming, and col. 15, lines 15-35, and col. 18, lines 30-34, and col. 30, lines 31-52)". Notwithstanding the grammatical inconsistencies in the Examiner's statement, it is respectfully submitted that the figure and passages of Land referred to by the Examiner, and indeed Land as a whole, do not teach or suggest imparting to a first beam a first cross-sectional shape and imparting to a second beam a second cross-sectional shape that is different from the first cross-sectional shape.

Specifically, the first two passages referenced by the Examiner relate to multiplexing/demultiplexing (m/d) of optical channels and selection of carrier frequencies based on "greater or less than some frequency" or "odd or even" criteria. This in no way relates to imparting to two beams different cross-sectional shapes in order to achieve the claimed interference pattern over a limited portion of the substrate's treatment area. As for Figure 12a and col. 18, lines 30 to 52 of Land, this describes a device having slits or gratings in its top surface and slits in its bottom surface which are used to *reduce or eliminate modulation by beams of unwanted orders*. There is absolutely no teaching or suggestion that the slits or gratings through which two given beams creating an interference pattern on the waveguide, say beams P<sub>1</sub> and P<sub>1</sub>' in Figure 12a, impart different cross-sectional shapes to the

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two beams, let alone different cross-sectional shapes causing the interference pattern to extend over a limited portion of the waveguide area exposed to electromagnetic radiation of the two beams.

Clearly, therefore, Land does not teach or suggest that:

- “[the] first mask imparts a first cross-sectional shape to the first beam of electromagnetic radiation”; and
- “[the] second mask imparts a second cross-sectional shape to the second beam of electromagnetic radiation”;

whereby “the first cross-sectional shape [is] different from the second cross-sectional shape.”

For the above additional reason, and notwithstanding that claim 51 is believed to be in condition for allowance due to its dependency on claim 1, it is once again respectfully submitted that claim 51 is in condition for allowance.

If for any reason the Examiner disagrees, then the Examiner is kindly and respectfully urged to identify which features of Land the Examiner considers as being the claimed masks for imparting different cross-sectional shapes to the first and second beams of electromagnetic radiation so as to create an interference pattern over a limited portion of the treatment area exposed to electromagnetic radiation of the first and second conditioned beams. The Examiner is also respectfully requested to note that an argument which fails to identify the claimed masks for imparting different cross-sectional shapes to the first and second beams cannot support a finding of obviousness, as the third criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) will not be satisfied.

#### Independent claim 20

The Examiner's attention is directed to the following features of claim 20, portions of which have been emphasized:

20. A method for inducing a modification of the index of refraction of a substrate sensitive to electromagnetic radiation, comprising;

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- a) conditioning with a first mask a first beam of electromagnetic radiation and producing a first conditioned beam of electromagnetic radiation;
- b) conditioning with a second mask a second beam of electromagnetic radiation and producing a second conditioned beam of electromagnetic radiation;
- c) directing the first and the second conditioned beams of electromagnetic radiation toward the substrate sensitive to electromagnetic radiation to expose a treatment area of the substrate to electromagnetic radiation;
- d) the first and the second conditioned beams of electromagnetic radiation interact to create an interference pattern over a limited portion of the treatment area.

The Examiner will appreciate that independent claim 20 recites features that are similar to those discussed above in respect of independent claim 1. Therefore, for reasons similar to those set forth above in respect of claim 1, it is respectfully submitted that Land does not teach or suggest conditioning first and second beams of electromagnetic radiation to respectively produce first and second conditioned beams of electromagnetic radiation such that, when the first and second conditioned beams are directed toward a substrate sensitive to electromagnetic radiation:

- (i) a treatment area of the substrate is exposed to electromagnetic radiation of the conditioned beams; and
- (ii) the first and the second conditioned beams interact to create an interference pattern over a limited portion of the treatment area.

In light of the above, it is respectfully submitted that at least one feature of claim 20 is neither taught nor suggested by the cited reference. Therefore, the Applicants respectfully submit that at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) is not satisfied. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 20 and it is respectfully submitted that claim 20 is in condition for allowance.

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If for any reason the Examiner disagrees, then the Examiner is kindly and respectfully urged to identify which features of Land the Examiner considers as being the claimed conditioning of first and second beams of electromagnetic radiation so as to create an interference pattern over a limited portion of the treatment area exposed to electromagnetic radiation of the first and second conditioned beams. The Examiner is also respectfully requested to note that an argument which fails to identify the claimed conditioning cannot support a finding of obviousness, as the third criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) will not be satisfied.

Dependent claims 21 to 38

Claims 21 to 38 depend either directly or indirectly on claim 20 and therefore include all of the features of claim 20. Hence, for the same reasons as those set forth herein above in respect of claim 20, it is respectfully submitted that claims 21 to 38 are in condition for allowance.

Independent claim 48

The Examiner's attention is directed to the following features of claim 48, portions of which have been emphasized:

48. A method for inducing a modification of the index of refraction of a substrate sensitive to electromagnetic radiation, said method comprising:
- a) generating a first beam of electromagnetic radiation and a second beam of electromagnetic radiation different from the first beam of electromagnetic radiation;
  - b) directing the first and the second beams of electromagnetic radiation toward the substrate sensitive to electromagnetic radiation to expose a treatment area on the substrate to electromagnetic radiation, the first and the second beams of electromagnetic radiation interacting to create an interference pattern over a limited portion of the treatment area.

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The Examiner will appreciate that independent claim 48 includes features which are similar to those discussed above in respect of independent claim 1. Therefore, for reasons similar to those set forth above in respect of claim 1, it is respectfully submitted that Land does not teach or suggest generating first and second beams of electromagnetic radiation that are different from each other, and directing the beams toward a substrate sensitive to electromagnetic radiation to expose a treatment area of the substrate to electromagnetic radiation of the beams, wherein the first and the second beams interact to create an interference pattern over a limited portion of the treatment area.

In light of the above, it is respectfully submitted that at least one feature of claim 48 is neither taught nor suggested by the cited reference. Therefore, the Applicants respectfully submit that at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) is not satisfied. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 48 and it is respectfully submitted that claim 48 is in condition for allowance.

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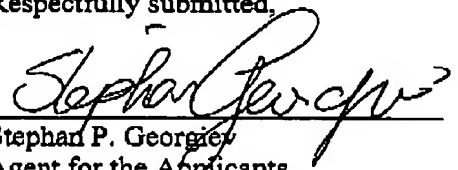
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### III. CONCLUSION

In view of the foregoing, the Applicants respectfully submit that claims 1 to 38 and 48 to 67 are in condition for allowance. Favourable reconsideration is requested. Early allowance of the application is earnestly solicited.

If the application is not considered to be in full condition for allowance, for any reason, the Applicants respectfully request the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims pursuant to MPEP 707.07(j) or in making constructive suggestions pursuant to MPEP 706.03 so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,

  
Stephan P. Georgiev  
Agent for the Applicants  
Reg. No. 37,563

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SMART & BIGGAR  
1000 de la Gauchetière St. West  
Suite 3300  
Montreal, Quebec, H3B 4W5  
CANADA  
Tel.: (514) 954-1500  
Fax.: (514) 954-1396